Patents 2004

Tyler J. Gomm, Nancy C. Kraft, Larry D. Phelps, and *Steven C. Taylor* were named on the patent issued to BBWI for an invention called the **Ultrasonic Fluid Quality Sensor System** that determines composition and flow characteristics of a multiple-component fluid. Using at least one 'sing-around circuit', the system determines the linear flow and velocity of a signal in the fluid, which can be correlated to a database for the multiple-component fluid.

A patent has been issued for new technology that monitors and reports the conditions of hazardous waste sites. *Ann Marie Phillips, Bradley M. Gardner, Kevin M. Kostelnik, Judy K. Partin, Gregory D. Lancaster,* and *M. Catherine Pfeifer* were named as the inventors for the **Sensor System for Buried Waste Containment Sites**. It monitors buried waste containment sites having a bottom wall and sidewall barriers. The sensors in this system use one or more sensor devices that report from inside the barrier on the physical condition of the surrounding soils and buried waste. It can also report strain or cracking of the actual barrier or leakage of radiation. The system also includes a signal processor to display the results graphically or for sounding an alarm

More advances in environmental technology resulted from the collaborative team of *Allan Propp, Mark Argyle, Stuart Janikowski, Robert Fox, William Toth, Daniel Ginosar, Tony Allen,* and *David Miller*. BBWI earned a patent in fiscal year 2004, entitled **System Configured for Applying Multiple Modifying Agents to a Substrate**. This invention designed chambers that facilitate a single continuous application in substrates using super critical fluids, instead of hazardous solvents, to apply multiple coatings onto fibers and filamentous materials. Using seals, the processing chambers can be isolated from one another and from the surrounding atmosphere.

An invention entitled, **Open-Cell Glass Crystalline Porous Material** uses sintered fly ash spheres to produce a porous material, which has properties useful for the immobilization of liquid radioactive waste, heat-resistant traps and filters, supports for catalysts, absorbents, and ion exchangers. *Dieter Knecht, Troy Tranter*, and *Jenya Macheret* teamed with a group of Russian researchers on this technology that will be useful in the environmental and chemical industries.

Henry Chu, H. Alan Bruck, Gary Strempek, and *Dominic Varacalle, Jr.* were named on BBWI's patent entitled **Lightweight Armor System and Process for Producing the Same**, which is a thermally sprayed metal matrix lightweight armor. Consisting of a hard ceramic on the outside, the process produces the metal matrix composite as the thickness increases. It is used for military and personal protection equipment.

Corey Radtke and *David Blackwelder* collaborated on an invention entitled **In Situ Reactor** device that samples, monitors and tests soil and groundwater directly in the subsurface, so that effective remediation strategies can be quickly and inexpensively identified. Useful in the environmental remediation market, the patented technology dramatically reduces cost, and time required on location than prior technologies.

Now working for the INEEL spinout company, The NanoSteel Company, LLC, *Daniel Branagan* was named on two patents this year. He was the sole inventor named on the patent entitled, **Method of Producing Metallic Materials**, which offers a method for producing super-hard metallic glass that becomes a nano-crystalline metal when applied to a variety of softer metals. Licensed to The Nanosteel Company in fiscal year 2002, the technology has yielded hundreds of requests for information from domestic and international industries.

BBWI also patented his technology **Methods of Forming Hardened Surfaces**, which is an innovative method of forming a metallic coating over a metallic substrate. This technology can be used for a new class of steel called devitrified nanocomposite steel that significantly increases of hardness and strength over conventional steel alloys.

Jack Cole, David Weinberg, and *Dennis Wilson* werer named on a patent for **Methods of Performing Downhole Operations Using Orbital Vibrator Energy Sources**. This technology provides a method for performing down hole operations in a well bore.

Scott Harris, Joel Johnson, Jeffrey Neiswanger, and *Kevin Twitchell* invented an improved call center called **Systems Configured To Distribute A Telephone Call, Communication Methods And Methods Of Routing A Telephone Call To A Service Representative**. This technology was the core technology for @Work Technologies Corporation's 1998 startup company.

Phillip West was named on a patent for **Regenerative Combustion Device**, a down-hole device that produces seismic shock waves. Cost effective and reliable, this seismic tool only requires electrical power to ignite combustible chemicals, which quickly decomposes."

A patent entitled, **Method, System And Apparatus For Monitoring And Adjusting The Quality Of Indoor Air**, was issued to BBWI with *Steve Hartenstein, Paul Tremblay, Mike Fryer*, and *Fred Hohorst* being named as the inventors. As the name implies, this invention monitors the air for contaminants and adjusts the fresh air mix to prevent overexposure to hazardous contaminants.

Ronald Mizia, Eric Shaber, John DuPont, Charles Robino, and *David Williams* collaborated on an invention entitled, **Neutron Absorbing Alloys**. This invention provides a new class of advanced neutron absorbing structural materials for use in spent nuclear fuel storage applications requiring structural strength, weld ability, and long-term corrosion resistance.

Five more inventors on an INEEL team completed a **Method and Apparatus For Selectively Harvesting Multiple Components Of A Plant Material**. *Reed Hoskinson, Richard Hess, Kevin Kenney, John Svoboda*, and *Thomas Foust* invented this method and apparatus for harvesting grain from plant material and at least one additional component of the plant material during a single pass of the equipment. This invention has implications for rural economy development and renewable energy from plant materials.

Craig Kullberg was named on a patent entitled **Condensation Induced Water Hammer Driven Sterilization**, which uses acoustic energy to treat a fluid, solid materials or objects in a fluid. Uses for this invention include water sterilization, de-gassing liquids, and treating wood fibers for paper pulp treatment.

BBWI was issued three patents this year with *Joel Hubbell* and *Buck Sisson*, as the inventors. One was for the **Deep Lysimeter**, a hydrological instrument used to sample liquids or monitor soil or substrates. This instrument also can obtain an indication of water pressure.

The second was for **Horizontal Advanced Tensiometer**, which can monitor water pressure and soil positions in order to determine how surrounding soil and rock hold water. The device can be positioned in areas beneath objects or overlying material facilitating the monitoring of soil water potentials at hard to reach soil positions.

The third patent was for the **Portable Suction Lysimeter**, which offers a method for retrieving a liquid sample through use of a portable sampling device.

Kevin McHugh invented a spray forming system for producing molds, dies, and related toolings. BBWI's patent for this process called **Rapid Solidification Processing System For Producing Molds, Dies and Related Tooling** atomizes liquid material into fine droplets by using high temperature and high velocity gas, the system then deposit droplets onto a pattern. This Technology formed the basis for the creation of RSP Tooling, Inc. a startup company located in Solon, OH.

Reva Nickelson, John G. Richardson, Kevin Kostelnik, and *Paul Sloan* developed an improved system and method for containing and treating buried waste and its effluents. Called the **Subsurface Materials Management and Containment System**, its barriers can be installed in a variety of geologies from soft soil to hard rock and permits testing to ensure the integrity of the barriers. This project has an international CRADA partner, Obayashi, who has licensed this patent.

Arthur Watkins, Collins Cannon, and *Charles Tolle* invented an apparatus and method for verifying the accuracy of a readout temperature sensor. This trio developed the **Device for Self-Verifying Temperature Measurement And Control**, which measures and verifies temperatures during operation.

Blair Grover, Joel Hubbell, Buck Sisson, and *William Casper* were named on a patent for a porous stainless steel tensiometer that can be installed using the direct push technology. This allows rapid installation in contaminated or uncontaminated sediments for evaluation of how water and contaminates move through the vadose zone.

Methods And Apparatus of Suppressing Tube Waves Within A Bore Hole And Seismic Surveying Systems also received a patent. *Phillip West* and *Daryl Haefner* collaborated on inventing this method and apparatus, which attenuates waves in a bore hole, while using seismic surveying systems. The bladder system design uses hydraulic restrictions to assist in absorbing acoustic energy.

Kent Sorenson invented methods that enhance bioremediation of ground water contaminated with nonaqueous halogenated solvents. Called **Halogenated Solvent Remediation**, this method has proven effective in tests at INEEL.

Monohar S. Sohal and *James E. O'Brien* are named for their collaboration on **Finned Tube with Vortex Generators for a Heat Exchanger**, an improved manufacturing technology to produce finned tube heat exchangers. The method delivers a continuous fin strip with at least one pair of vortex generators permitting the tube to be rotated and linearly displaced in order to spirally wrap the continuous fin strip around the tube.

A patent entitled **PINS Chemical Identification Software** has been issued for the work of *Gus Caffreya* and *Ken Krebs*. The PINS software allows one to non-intrusively identify the fill of containers, including munitions, one might be afraid to open, especially if the object under test holds explosives, a chemical warfare agent such as nerve gas, or a dangerous industrial chemical like hydrogen fluoride. This invention has won an R&D-100 award and INEEL has licensed the technology to Ortec via a CRADA agreement. The system is widely employed by the U.S. military, both within the United States, and overseas, including Iraq.

Paul Lessing was named as sole inventor on BBWI's patent entitled **Polymeric Hydrogen Diffusion Barrier With High Pressure Storage Tank.** This invention offers a method of fabricating a storage tank so a technique can be used to prevent hydrogen diffusion. The storage tank is coupled with an electrochemically active hydrogen diffusion barrier to achieve its purpose.

John A. Johnson, Daphne L. Stoner, Eric D Larsen, Karen S. Miller, and *Charles R.Tolle* have developed an invention called **Learning-Based Controller for Biotechnology Processing**. This invention is a process control in biotechnology mineral processing and manipulates a minerals bioprocess to find extremes. It uses a learning-based controller for bioprocess oxidation of minerals during hydrometallurgical processing to complete the operation and operates with or without human supervision.

A new invention using negative air pressure and special seals contains contaminates released during drilling operations. It is entitled, **Subterranean Drilling and In Situ Treatement of Wastes Using a Contamination Control System**, and was invented by *James J. Jessmore, Guy G. Loomis, Mark C. Pettet* and *Melissa C. Flyckt*.